

WHAT IS CLAIMED IS:

1. A gradient liquid transfer device for a nano/micro liquid chromatograph, provided with

a primary-solvent liquid transfer section having a metering pump for transferring a primary solvent and a primary-solvent passage subsequent to the metering pump;

at least one liquid transfer section having a metering pump for transferring one other solvent and a solvent passage subsequent to the metering pump;

a solvent mixing section connected to the passages and to a mixed-solvent passage for passing a mixed solvent made by mixing the solvents supplied through the passages at a predetermined mixing ratio and for leading to a subsequent separation system; and

a control section for controlling the mixing ratio of the mixed solvent transferred to the subsequent separation system,

the gradient liquid transfer device comprising, in the vicinity of the solvent mixing section, opening and closing means capable of opening and closing the solvent passage for transferring the one other solvent.

2. A gradient liquid transfer device for a nano/micro liquid chromatograph according to Claim 1, further comprising a liquid connection section for connecting the primary-solvent liquid transfer section and the at least one liquid transfer section.

3. A gradient liquid transfer device for a nano/micro liquid chromatograph, provided with

a primary-solvent liquid transfer section having a metering pump for transferring a primary solvent and a primary-solvent passage subsequent to the metering pump;

at least one liquid transfer section having a metering pump for transferring one other solvent and a solvent passage subsequent to the metering pump;

a solvent mixing section connected to the passages and to a mixed-solvent passage for passing a mixed solvent made by mixing the solvents supplied through the passages at a predetermined mixing ratio and for leading to a subsequent separation system; and

a control section for controlling the mixing ratio of the mixed solvent transferred to the subsequent separation system,

the gradient liquid transfer device comprising:

first storing means formed of the metering pump in the at least one liquid transfer section and a part of the solvent passage subsequent to the metering pump and filled in advance with a liquid having a low compression rate; and

second storing means formed of a part of the solvent passage subsequent to the first storing means and filled with a required amount of the one other solvent subsequent to the liquid in advance.

4. A gradient liquid transfer device for a nano/micro liquid chromatograph according to one of Claims 1 to 3, wherein the metering pumps are syringe-type metering pumps, each transferring the entire solvent by pushing the syringe in a single stroke.

5. A gradient liquid transfer method for a nano/micro liquid chromatograph provided with:

a primary-solvent liquid transfer section having a metering pump for transferring a primary solvent and a primary-solvent passage subsequent to the metering pump;

at least one liquid transfer section having a metering pump for transferring one other solvent and a solvent passage subsequent to the metering pump; and

a solvent mixing section connected to the passages and to a mixed-solvent passage for passing a mixed solvent made by mixing the solvents supplied through the passages at a predetermined mixing ratio and for leading to a subsequent separation system,

the nano/micro liquid chromatograph gradually changing the mixing ratio of the mixed solvent and transferring the mixed solvent to the subsequent separation system for gradient elution, and

comprising, in the vicinity of the solvent mixing section, opening and closing means capable of opening and closing the solvent passage for transferring the one other solvent, and

the gradient liquid transfer method comprising:

a first step of closing the opening and closing means, of filling, in advance, a passage from the metering pump of the at least one liquid transfer section to the opening and closing means with the one other solvent, and of applying an appropriate pressure to the one other solvent;

a second step of transferring the primary solvent to the subsequent separation system from the primary-solvent liquid transfer section through the solvent mixing section; and

a third step of opening the opening and closing means, of transferring the one other solvent to the solvent mixing section at a predetermined flow rate, and of transferring the mixed solvent having the predetermined mixing ratio of the primary solvent and the one other solvent to the subsequent separation system.

6. A gradient liquid transfer method for a nano/micro liquid chromatograph according to Claim 5,

the nano/micro liquid chromatograph further comprising a liquid connection section for connecting the primary-solvent liquid transfer section and the at least one liquid transfer section,

wherein pressure generated in the primary-solvent liquid transfer section in the second step is applied to the at least one liquid transfer section to apply the appropriate pressure to the one other solvent in the first step.

7. A gradient liquid transfer method for a nano/micro liquid chromatograph provided with:

- a primary-solvent liquid transfer section having a metering pump for transferring a primary solvent and a primary-solvent passage subsequent to the metering pump;

- at least one liquid transfer section having a metering pump for transferring one other solvent and a solvent passage subsequent to the metering pump; and

- a solvent mixing section connected to the passages and to a mixed-solvent passage for passing a mixed solvent made by mixing the solvents supplied through the passages at a predetermined mixing ratio and for leading to a subsequent separation system,

the nano/micro liquid chromatograph gradually changing the mixing ratio of the mixed solvent and transferring the mixed solvent to the subsequent separation system for gradient elution, and

the gradient liquid transfer method comprising:

- a first step of filling, in advance, a liquid having a low compression rate in a part of the solvent passage subsequent to the metering pump of the at least one liquid transfer section;

- a second step of filling a required amount of the one other solvent, subsequent to the liquid, in the solvent passage;

- a third step of transferring the primary solvent to the subsequent separation system from the primary-solvent liquid transfer section through the solvent mixing section; and

- a fourth step of transferring the one other solvent to the solvent mixing section at a predetermined flow rate, and of transferring the mixed solvent having the predetermined mixing ratio of the primary solvent and the one other solvent to the subsequent separation system.

8. A gradient liquid transfer method for a nano/micro liquid chromatograph according to one of Claims 5 to 7, wherein the metering pumps are syringe-type metering pumps, each transferring the entire solvent by pushing the syringe in a single stroke.